Inter-Range Control Center Provides Means to Orchestrate System-of-Systems Testing

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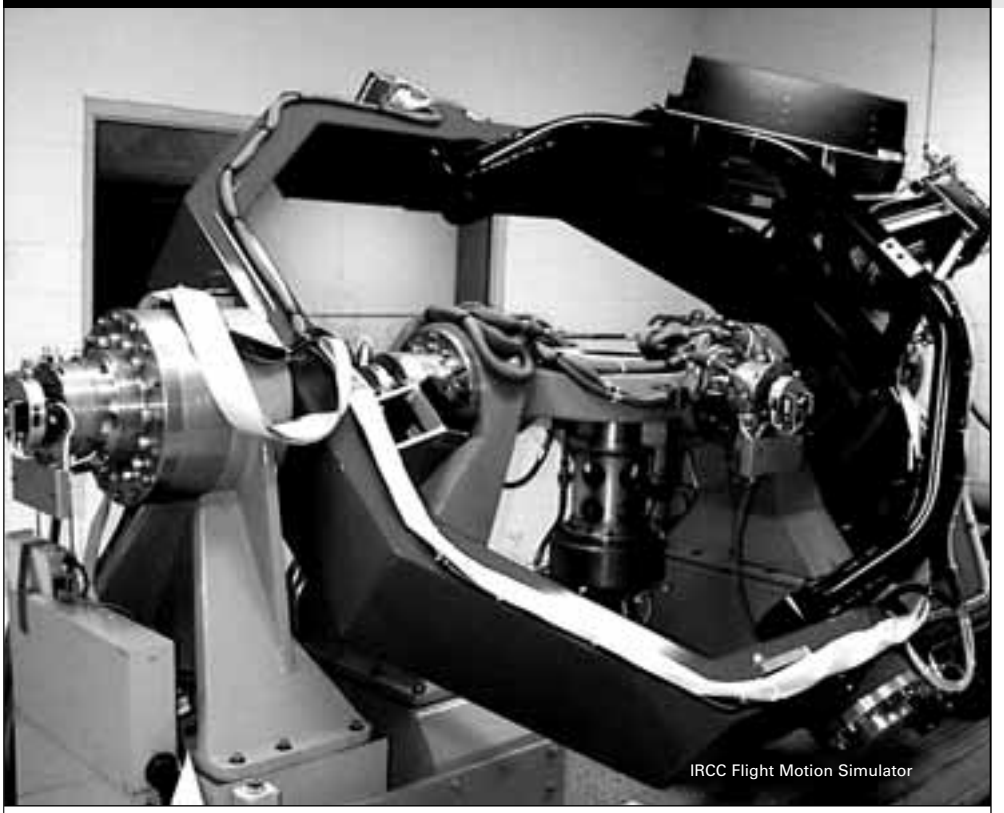
FUTURE COMBAT SYSTEMS
FCS
One Team-The Army/Defense/Industry



IRCC Flight Motion Simulator

The Developmental Test Command (DTC) Inter-Range Control Center (IRCC) orchestrates simultaneous test events distributed across numerous test centers. Future Combat Systems (FCS) demand this type of distributed testing because it is the only way to realistically determine how the diverse components of FCS are operating together as an interlinked system-of-systems (SoS).

The Army Test and Evaluation Command (ATEC) faces parallel challenges to those faced by our Armed Forces as it transforms to meet the current and future challenges of modern warfare and military operations other than war. These challenges include keeping pace with the fast-track acquisition of systems such as the Army's new Stryker family of combat vehicles and looking years ahead to ensure we are technologically and strategically prepared to test FCS. FCS brings three new test and evaluation challenges to the table:

- The FCS brigade-level organization's operational footprint exceeds the boundaries of any single DTC range.
- Key performance parameters dictate testing of multiple interdependent systems simultaneously across multiple ranges.
- The FCS test program requires a mix of live, virtual and constructive events.

As evidenced in Iraq and Afghanistan, today's military operations tempo underscores the Army's need for superior situational awareness. Diverse operational elements must be able to share a common picture of the battlefield situation, and the shooter must be linked by reliable technology to the decision maker. FCS's success will depend on an interlinked SoS that enables the Soldier to see first, understand first and act decisively. This must happen in the context of a Joint and Expeditionary Force environment because it is very unlikely that an FCS-equipped unit of action will be engaged in combat alone.

If testing is to reflect this reality, FCS's ground-based and aerial weapons platforms — including unmanned air and ground systems designed to provide information, detect hazards or deliver weapons — must at some point be SoS tested. This will require test events to be distributed across multiple test centers and ranges, sometimes simultaneously.

For the past several years, DTC has been acquiring the technical capabilities to enable *distributed testing*. By investing heavily in state-of-the-art Virtual Proving Ground (VPG) technologies at its centers throughout the United States, DTC developed validated models and synthetic test environments that enable realistic virtual testing. DTC also developed the capability to distribute test scenarios across multiple test sites, an essential capability for evaluating FCS's diverse components to ensure they perform to the standards under which they are designed to operate.

Situational awareness is a key element of success on the modern battlefield.

As part of this VPG program, DTC has conducted distributed testing experiments for more than 10 years. A significant finding from these experiments is the need to command, control and manage the configuration of distributed test events. To meet this exacting need, DTC developed a construct called IRCC.

Similar to the conductor of a large, complex orchestra, IRCC's role is to ensure that all the players in a distributed test receive and follow their cues, play together at the right time and tempo and produce harmonic results. While each instrument in this test "orchestra" may play from its own sheet of music, the various pieces come together as one under IRCC's direction. In a distributed test, IRCC has the ability to see the entire "score" and portray it in a way that is useful to testers, evaluators and customers.

In line with DTC's distributed testing concept, a Distributed Test Control Center (DTCC) will be established at all DTC test ranges. These DTCCs, linked together via the Defense Research and Engineering Network, will be able to support distributed test scenarios with their DTCC counterparts at other DTC test ranges. Some tests distributed across more than one test center will not require a multitude of players, nor the level of centralized command and control (C2) envisioned for IRCC. For these events, control and management can occur at the DTCC level.

Some FCS-required tests will involve most or all of DTC's test centers. The IRCC at White Sands Missile Range, NM, will play a crucial role in these test events' success. Each DTC test center has its own capabilities and instrumentation for testing FCS's diverse SoS components. By working together through the IRCC, they become more than the sum of their parts. The IRCC will facilitate complete virtual FCS battlespace replication using test assets to exercise, measure and analyze the synergies achieved through the SoS approach to testing.

The IRCC concept of operations is still taking shape through the work of an integrated process team that includes testers, evaluators and industry representatives, but the focus is on the testing needed for the FCS program's success.

Program managers plan to use a large distributed test network to link each FCS System-of-Systems Integration Laboratory (SoSIL) while working on their respective areas of FCS development. The SoSIL Virtual Framework network will provide the ability to tap into most of ATEC's test facilities, as well as battle labs, industry sites and other research and development sites as needed.

To facilitate command, control and configuration management, DTC selected White Sands Missile Range as IRCC for the DTC portion of this vast

network. White Sands was chosen largely because of its experience in managing complex missile test programs and the C2 capabilities afforded by its J.W. Cox Range Control Center. IRCC will be the point of entry for the FCS SoSIL, and SoSIL will coordinate with IRCC when test activities at DTC ranges are required.

The IRCC concept was put into action during two events at White Sands, both designed to demonstrate the Synthetic Environment Integration Testbed's (SEIT's) initial operational capability, a VPG modeling and simulation initiative. DTC's principal goal for SEIT is to develop a high-resolution representation of natural and man-made environments from physics-based modeling and simulation capabilities. The intent is to develop common and standard environment applications, which could be adapted to the test requirements of a specific system throughout its life cycle, for any system within DOD's acquisition program.

To support the August 2003 SEIT demonstration, the J.W. Cox Range Control Center served as IRCC and exercised oversight and control over a variety of events that required DTC test center participation. The large-screen central viewing station at this control center was used to monitor the demonstration events as they unfolded. Demonstration participants at White Sands and other DTC test centers were able to respond to events and provide various reports using remote role-player workstations.

The demonstration scenario involved a Blue Force whose objectives were to attack and seize an airfield at one location and an ammunition bunker at another. The scenario called for the opposing Red Force to deny access to these sites by simulating the release of chemical agents by fixed-wing aircraft that actually flew over a section of the test range. The scenario was played out over simulated topography that represented an actual 400-square kilometer section of terrain at DTC's Yuma Proving Ground in Arizona.

The demonstration included a variety of maneuvers by virtual forces, live and recorded aircraft and vehicle movements, virtual weather effects on the simulated dissemination of chemical agent, and stimulation of actual infrared and chemical/biological sensors at multiple test centers. A simulated tactical operations center at White Sands took part in the demonstration, also responding to the scenario with the aid of a remote role-player workstation.

The SEIT demonstration was the first time all DTC's test centers participated together to support a single test event simultaneously. Getting to the point where all DTC test centers could communicate with one another and play in the test scenario was a major accomplishment. It was the result of years of effort to develop common architecture, integrated information systems and common, reusable tools. This demonstration's successful execution points the way to the future, where DTC will work in partnership with other ATEC elements, the FCS Lead System Integrator (Boeing and Science Applications International Corp.), the FCS Combined Test Organization, the FCS Program Manager and other interested parties in this critical test program.

For more information about IRCC, contact Rick Cozby at (410) 278-1474, DSN 298-1474 or send e-mail to **cozbyr@dtc.army.mil**.

More information about DTC's VPG initiatives is also available at **http://vpg.dtc.army.mil**.

Systems that provide situational awareness will have to be tested as they are designed to be used, requiring simultaneous tests at multiple sites.

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